

moles - Particles Relationship

$$1 \text{ mole} = 6.02 \times 10^{23} \text{ particles}$$

↑
atoms, ions,
molecules, or
formula units

Ex) 1) How many molecules are in 163 moles of ozone, O_3 ?
GIVEN

$$\frac{163 \text{ moles} \times 6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = 9.8126 \times 10^{25} \text{ molecules}$$

$$= 9.81 \times 10^{25} \text{ molecules}$$

2) How many moles are in 7.95×10^{20} atoms of platinum, Pt?
GIVEN

$$\frac{7.95 \times 10^{20} \text{ atoms} \times 1 \text{ mol}}{6.02 \times 10^{23} \text{ atoms}} = 0.001320598 \text{ mol}$$

$$1320$$

$$1.32 \times 10^3$$

$$= 0.00132 \text{ mol}$$

$$1.32 \times 10^{-3} \text{ mol}$$

3) How many atoms of Na are in 2.50 moles of Na_2O ?
GIVEN

$$\frac{2.50 \text{ mol } Na_2O \times 6.02 \times 10^{23} \text{ f. units}}{1 \text{ mol}} = 1.505 \times 10^{24} \text{ f. units } Na_2O$$

$$\frac{1.505 \times 10^{24} \text{ f. units } Na_2O \times 2 \text{ atoms Na}}{1 \text{ f. unit } Na_2O} = 3.01 \times 10^{24} \text{ atoms Na}$$

$$1 \text{ f. unit } Na_2O = 2 \text{ atoms Na}$$

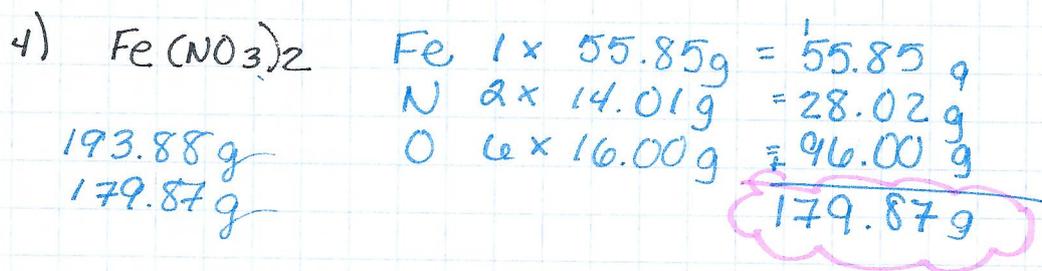
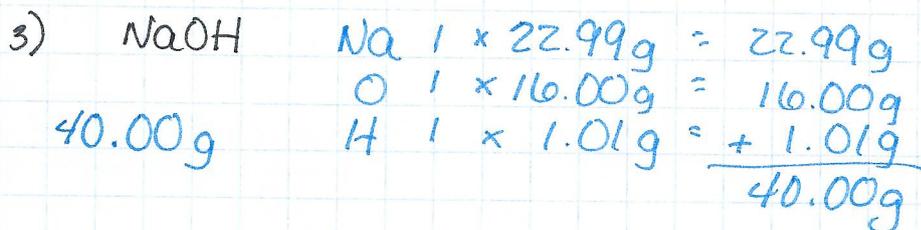
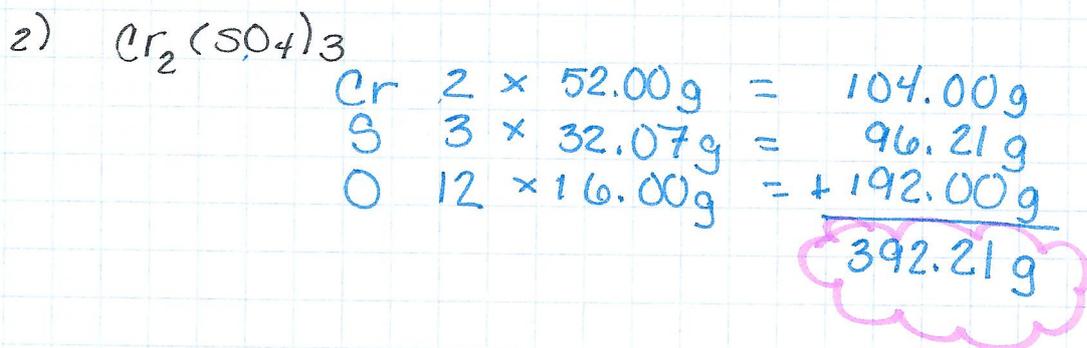
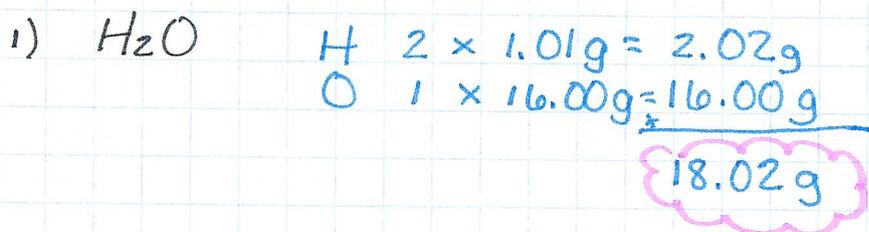
6. mole - mass Relationship

A. molar mass - the mass of 1 mol of any substance in grams (g).

(1) element - the molar mass = atomic mass

(2) compound - the molar mass is the sum of the molar masses of each element

Ex) Calculate the molar mass:



Ex) Converting b/w moles & mass

1) How many moles are in 100.0g of CO₂?

$$\frac{100.0\cancel{\text{g}}}{44.01\cancel{\text{g}}} \times \frac{1\text{ mol}}{1} = 2.27210861\text{ mol}$$

= 2.272 mol

CO₂ Mass

$$\begin{array}{r} \text{C } 1 \times 12.01\text{g} = 12.01 \\ \text{O } 2 \times 16.00\text{g} = 32.00 \\ \hline 44.01 \end{array}$$

2. What is the mass of .75 moles of BaF₂?

$$\frac{.75\cancel{\text{mol}}}{1\cancel{\text{mol}}} \times \frac{175.33\text{g}}{1} = 131.4975\text{ g}$$

= 130 g

BaF₂ mass

$$\begin{array}{r} \text{Ba } 1 \times 137.33\text{g} = 137.33 \\ \text{F } 2 \times 19.00\text{g} = 38.00 \\ \hline 175.33\text{g} \end{array}$$